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(54) Control and display of a plurality of channels

(57) The apparatus comprises channel controllers adjustable to set values (as described of theatrical lighting dimmers), means for displaying the settings of a group 30A-F of the channels and means for varying the display to show the setting of other groups of channels. A microprocessor and a memory storage device may control the settings. The display may be of the settings of a sequentially adjacent group of channels or of the settings applied to active non-sequentially adjacent channels. The settings can be varied individually or simultaneously by using a keyboard 46 and or buttons 42, 44 and the group of displayed settings can be varied by the use of buttons 32, 34. A row 38 of three state LED devices 40 gives an indication of the operational control settings of all the outputs.

The controllers may comprise manually movable sliders and means for sensing movement of the sliders to provide, via a look-up table, motor drive signals which cause resistance to movement of the sliders to provide "feel" to the operator.

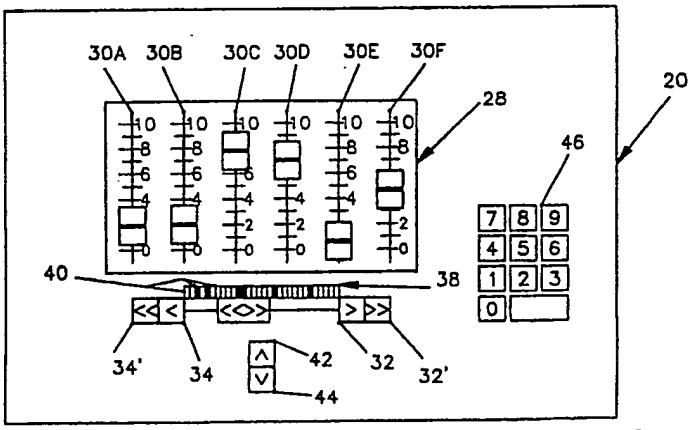

Figure 2.

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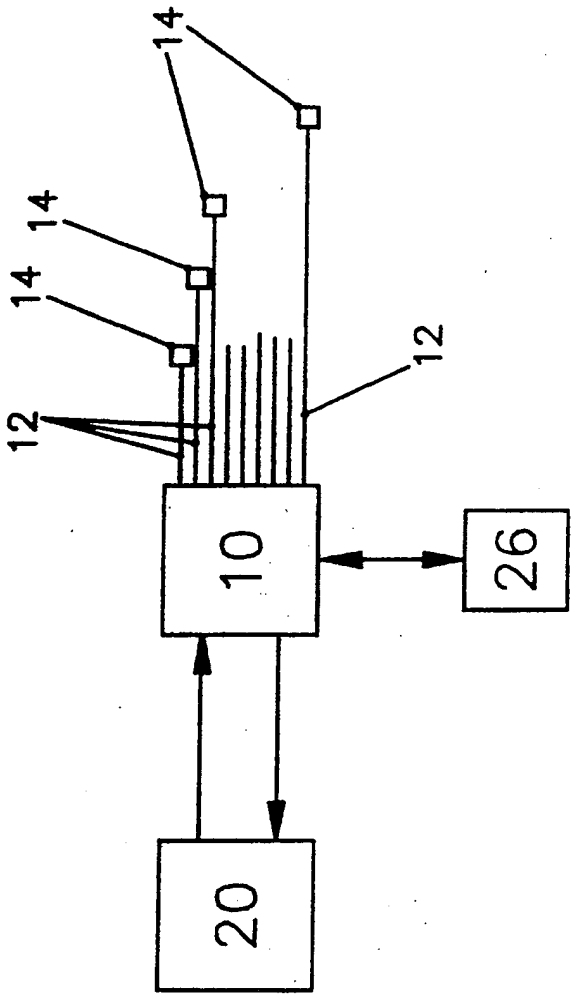


Figure 1.

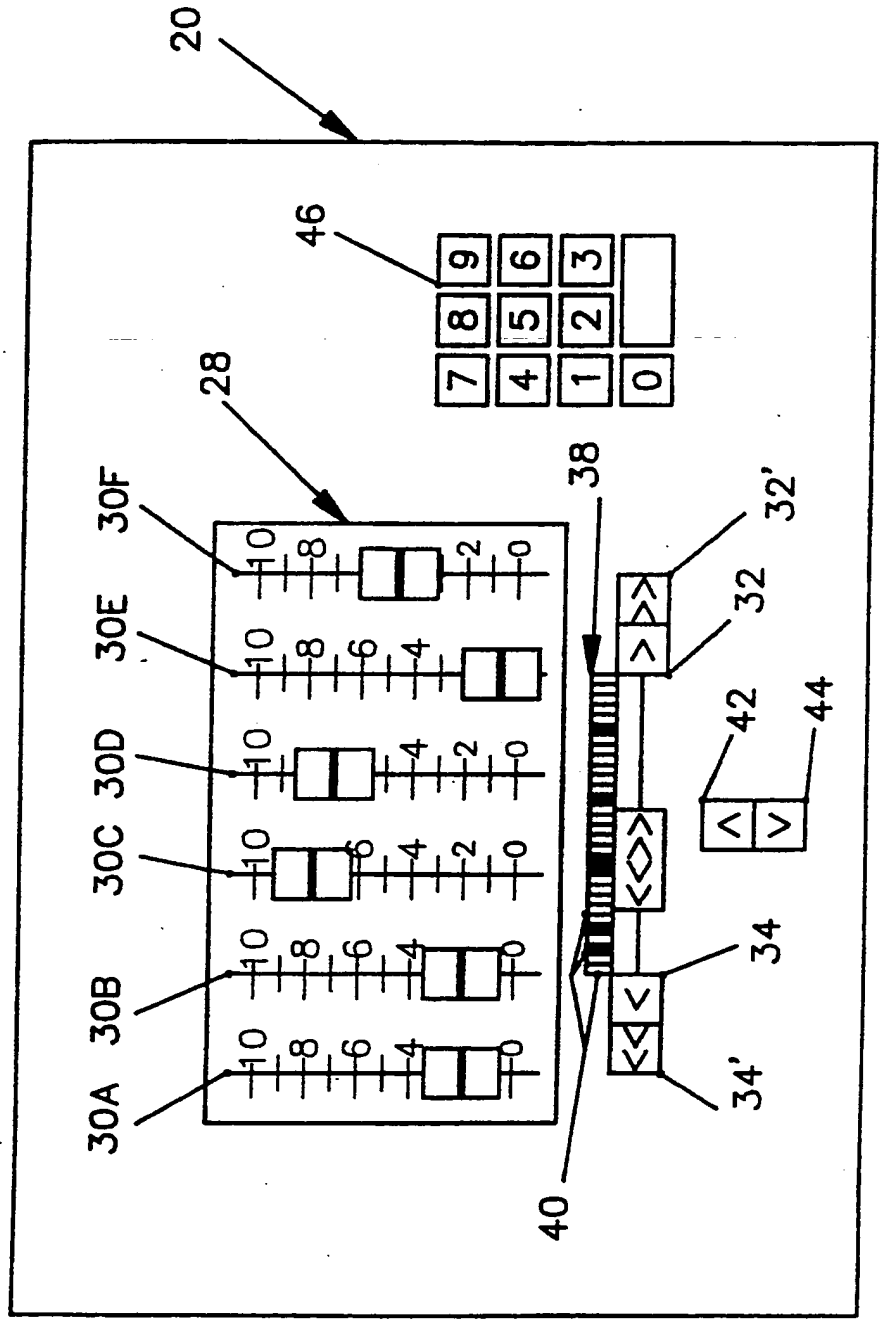

20
46
9
6
3
8
5
2
7
4
1
0
28
38
32'
32
30F
30E
30D
30C
30B
30A
42
44
34
34'
40

Figure 2.

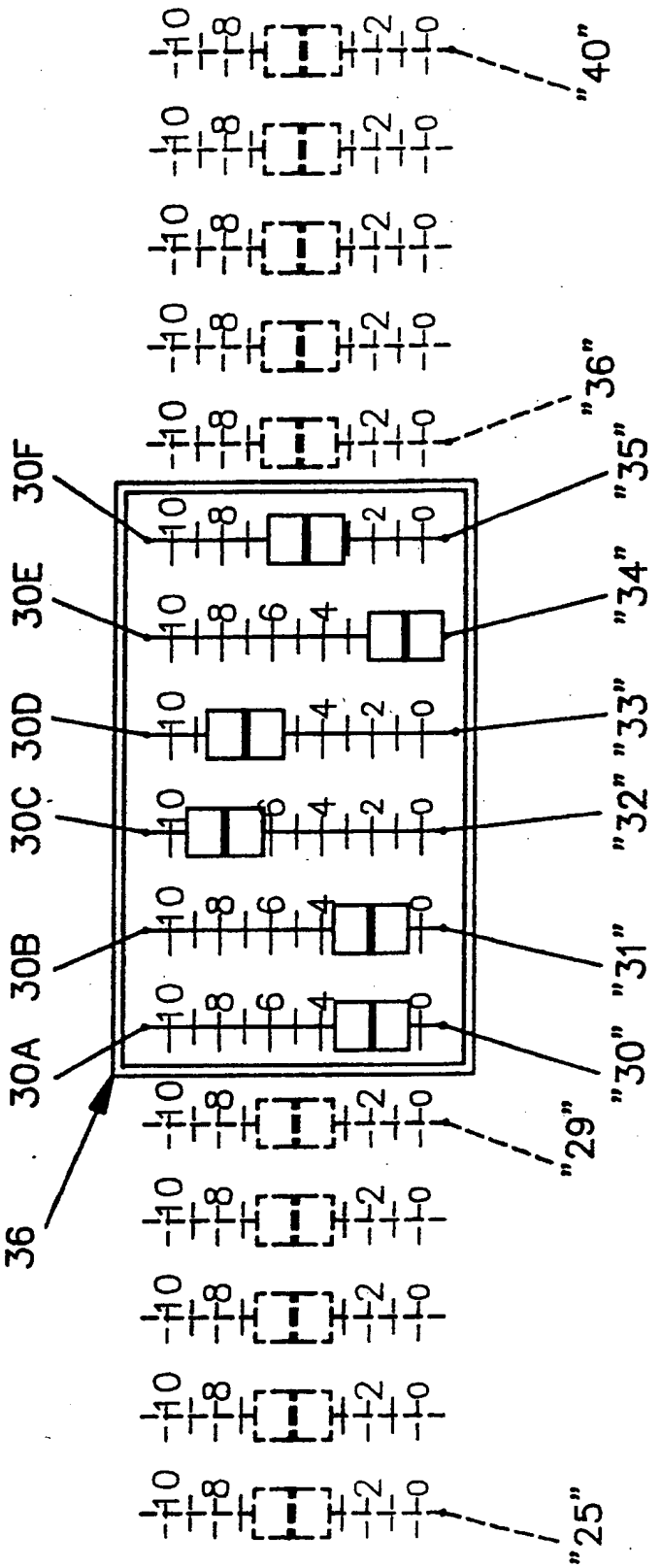


Figure 3A.

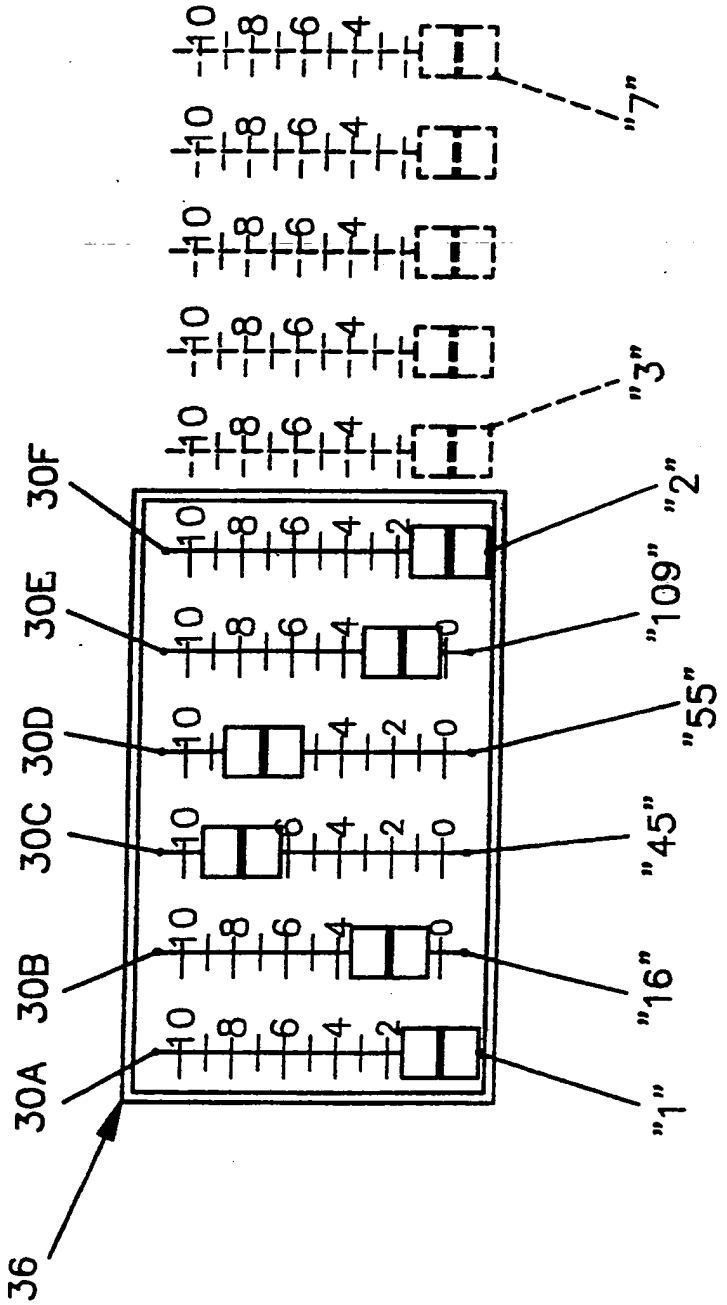


Figure 3B.

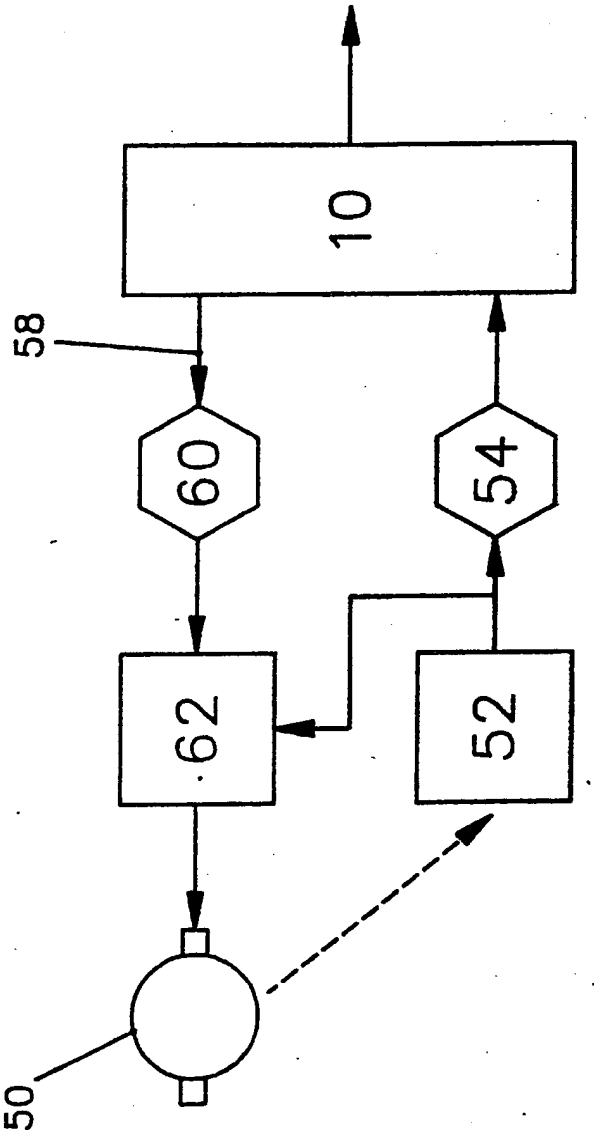


Figure 4.

CONTROLLING OPERATIONS

DESCRIPTION

The invention relates to methods and apparatus for controlling operations, particularly methods and apparatus for controlling the operational settings applied to a plurality of controllable channels.

In the description and claims which follow the term controllable channel is to be taken to mean any device or collection of devices which responds to variation of an operational control setting applied thereto to provide an output therefrom. The controllable channels may comprise motorised linear or rotary devices operable to control the electrical current or voltage fed to further elements - for example controllable channels may be arranged to control the stage lights in a theatrical or musical production.

Historically controllable channels have been controlled by faders, that is to say manually operable rheostats mounted adjacent one another in a console and each connected in the electrical line power feed to a light or set of lights being controlled. The positions of arms of the rheostats are manually variable to control the amount of power fed to a light or lights controlled by it and so the degree to which the or each light is lit.

Other forms of power control devices - e.g. thyristor and triac control devices - may be used if desired.

With the increasing use of large numbers of lights

in modern theatrical and musical productions the number of lights (which today can number several hundred) and the amount of equipment required to control them has increased until the consoles have become increasingly large and the control increasingly slow and more complex until, in practical terms, it has become impossible to use such a system.

With the advent of microprocessors different approaches to the operational control of large numbers of channels in such systems have become made possible. One which has been proposed provides a relatively small number of physical channel controllers (say one or two) which may be selectively connected by the processor to of ones of a large number of different controllable channels - a user using a keyboard to select which particular channels are to be connected at any time to the physical channel controllers provided in the system.

Such an arrangement greatly reduces the size of the control console and eases operation as desired, however, the speed and degree of control which may be effected is limited.

Proposals have also be made to use processors to provide preset channel settings stored in the memory of (or associated with) the processor together with a larger number (thirty to ninety) channel controllers. Such an arrangement enables easier operational setting of the controllable channels, however, the console must still be relatively large to house the large number of channel controllers provided.

Objects of this invention include the provision of methods and apparatus enabling control of a plurality of channels - in particular theatrical lighting channels - which alleviates or overcome the noted drawbacks of the methods and apparatus known to us at present.

In one aspect the invention provides a method enabling control of operation of a plurality of controllable

channels, the method including the steps of enabling operational control settings to be applied to some or all of the channels, of enabling those settings to be selectively varied, of displaying the control settings applied to a group of said channels within the plurality of channels, and of enabling the displayed group of channel settings to be varied so as to display the settings applied to others of the controllable channels within the said plurality of channels.

The method preferably includes the step of indicating the settings applied to a set of controllable channels greater in number than said group of channels - desirably all of the plurality of channels.

The method may provide for the displayed group of controllable channel settings to be variable by enabling the settings of channels of the plurality of channels to be sequentially brought into and removed from the group of displayed channel settings in response to inputs by a user.

With advantage, said display of the settings of the group of controllable channels is effected by driving drivable channel controllers for the time being assigned to the channels to positions representative of the settings applied to those channels.

Desirably, the method provides adjacent visual displays of the settings applied to active non-sequentially adjacent controllable channels of said plurality of channels.

The method may provide the settings applied to more than one controllable channel are variable in response to a single input by a user.

With particular advantage, the method provides for the use of a microprocessor to enable the selective variation of the setting of each controllable channel and to control said display of those channel settings.

In a second aspect the invention provides apparatus enabling control of operation of a plurality of

controllable channels which comprises, means enabling operational control settings to be applied to each of the channels, means enabling those settings to be be selectively varied, means for displaying the settings applied to a group of said channels within said plurality of channels, and means enabling the displayed settings to be varied to show the settings applied to others of the channels within said plurality of channels.

The means for displaying the settings applied to the group of controllable channels may comprise a group of elements each of which is operable to display the setting applied to an assigned one of the said group of channels and the means enabling variation of the displayed settings may comprise means for altering the channels assigned to ones of said elements.

Means may be provided enabling the settings of controllable channels of the plurality of channels to be sequentially brought into and removed from the group of displayed channel settings in response to inputs by a user.

The said elements may comprise channel controllers each of which is drivable to a position representative of the setting applied to a controllable channel for the time being assigned thereto.

The apparatus may further include means enabling the settings applied to a set of controllable channels greater in number than said group of channels to be indicated - desirably all of the channels. The means may be a set of LEDs.

With especial advantage the apparatus may be operable to provide adjacent displays of the control settings applied to active non-sequentially adjacent ones of said plurality of controllable channels channels.

Preferably, means are provided allowing alteration of the rate at which the displayed group of control settings to be varied in response to an input by a user. And means may be provided enabling alteration of the rate at which the

operational settings applied to each of the controllable channels is selectively variable in response to an input by a user.

Again, the apparatus may include means enabling the operational settings applied to more than one controllable channel to be variable in response to a single input by a user.

With advantage the apparatus includes a microprocessor operable in response to an input from a user to enable selective variation of the setting of each control channel and to control said display of controllable channel settings.

In a third aspect the invention provides a device usable in the above defined apparatus, which device has a part which is manually movable to control the value of a setting applied to a controllable channel and the position of the manually movable part is proportional to the rate of change applied to the said value, wherein the device includes means for sensing the rate of change applied to said value and applying to the manually movable part a force resisting movement thereof by an amount proportional to the rate of change applied to the said value so as to provide to a user a tactile indication of the rate of change applied to the said value.

Preferably, the device includes a motorised part which is manually movable and sensing means operable to sense the position of the manually movable motorised part and to control the rate of alteration of the said value and which further comprises means for generating and feeding to the manually movable motorised part a signal which is a function of the position of the control knob of the manually movable motorised part from a median position and which tends to exert a force thereon resisting movement of the manually movable motorised part from said median position.

The above and other aspects features and advantages of the invention will become apparent from the

following description of a system enabling control of a plurality of channels - in particular theatrical lighting channels - now made with reference to the accompanying drawings in which.

Figure 1 illustrates in outline form a system embodying the invention,

Figure 2 illustrates a unit incorporated in the system of Figure 1,

Figure 3 illustrates at A and B two forms of display obtainable using the system of Figure 1 when operating in first and second modes of operation, and

Figure 4 illustrates schematically part of the system of Figure 1 in even more detail.

With reference to Figure 1 of the drawings the system is shown to include a microprocessor 10 having a plurality of outputs 12 each of which is used as an operational control setting for a respective dimmer 14. The number of outputs 12 of processor 10 and the number of dimmers 14 controlled thereby may be any number desired and which the processor is capable of controlling (e.g. several hundred).

Other elements of the system are a keyboard unit 20 (which will be further described below) and a memory storage device 26 - e.g. a magnetic disc drive unit.

Processor 10 is operable to provide operational control settings to the controllable channels including dimmers 14 via the respective outputs 12. By inputting desired settings - via the keyboard 20 - a user may vary individual ones of the control settings on the outputs 12 and therefore also the settings of the individually associated dimmers 14 (or if desired more than one of the dimmers 14 simultaneously).

Again, a user may call from the memory storage device 26 a plurality of operational control settings for different ones (or all) of the dimmers 14.

Processor 10 is also operable to provide to the

user - via unit 20 - a display of the operational control settings on outputs 12 applied to dimmers 14.

This display of the settings applied (see Figures 2 and 3A) is provided by a bank 28 of six motorised slider channel controllers 30A, 30B, 30C, 30D, 30E and 30F forming part of unit 20. Each channel controller 30 is driven - in response to an output from processor 10 - to a position in which it displays the actual setting of one of a group of outputs 12 controlling a dimmer 14 forming a part of complete set of dimmers 14 being controlled.

In Figure 3A the physical display provided by controllers 30 is shown to be that of the actual settings of six outputs 12 numbered "30" to "35" in a complete set of outputs 12 controlling more than 100 dimmers 14 - the group of outputs 12 actually displayed by the channel controllers 30 being shown in full line and separated from others of the complete set of outputs 12 - shown in dotted line - by a double line 36.

Each of the six channel controllers 30A to 30F has assigned to it by processor 10 the actual control setting applied by the apparatus to a respective one of the six outputs 12 numbered "30" to "35" provided by the apparatus.

The particular operational settings forming the group of settings displayed by bank 28 of controllers 30 is variable by the user pressing a button 34 or 32 on the keyboard 20 to "scan" sequentially across the complete set of control settings applied to outputs 12 and thus bring into view the actual settings applied to others of the outputs 12.

The arrangement preferably provides that on pressing button 34 the actual settings displayed are incremented to increase the "number" of the output 12 being displayed - that is to say in moving from the condition shown in Figures 2 and 3A by pressing button 34 the display is varied by removing displayed setting "30" from channel controller 30A, shifting displayed settings "31" to "35"

onto channel controllers 30A to 30E respectively, and driving channel controller 30F to a position displaying the setting applied to setting "36". Continued depression of button 34 next causes the display of setting "31" to be removed from channel controller 30A, the displays of settings "32" to "36" to be moved to channel controllers 30A to 30E, and channel controller 30F to display the setting applied to setting "37" - and so on until the setting of the last output 12 of the complete set of outputs of the forms part of the display given by the channel controllers 30.

Depression of button 32 decrements the displayed group of outputs 12 in an analogous manner.

Thus by depression of buttons 32 and 34 an user can scan over all the actual settings applied to the outputs 12 - the bank 28 of channel controllers 30A to 30F acting as a "window" selectively displaying the outputs 12 and thereby the settings applied to the dimmers 14 being controlled.

The buttons 32 and 34 my be augmented by further buttons 32' and 34' by which the rate at which the display "window" 36 passes over all the outputs 12 is increased, or alternatively to vary the incremental steps by which the displays given by channel controllers 30 is altered. Depression of button 32' (or 34') for example being arranged to provide that the display is altered in steps of two, three, four, five or six outputs 12.

Unit 20 further includes a row 38 of three state (OFF - GREEN - RED) LED devices 40 in number greater than the number of channel controllers 30 - in this case equal to or greater than the total number of outputs 12 - and which are arranged to provide an indication of the operational control settings of all the outputs 12. Each LED 40 has associated with it one or more of the outputs 12 and is switched between its three states in accordance with settings of the output(s) 12 for the time being assigned to it and the relative position of the "window" 36 provided by the bank 28 of channel controllers 30.

Desirably each output 12 which is "active" - that is to say providing control of a dimmer 14 to turn a light in the associated channel ON is indicated by switching the associated LED 40 RED. The LEDs 40 which are associated with outputs 12 providing actual control of a dimmer 14 to turn a light in the associated channel OFF are switched OFF unless the LED 40 is associated with an output 12 covered by the display give by the bank 30 of channel controllers in which case it is switched GREEN.

It will be appreciated that row 38 of LEDs 40 provides an indication of the settings of all the outputs 12 of the processor 10 - and therefore of the dimmers 14 controlled by the apparatus - and that upon movement of the "window" 36 displayed by channel controllers 30A to 30F the relative positions of the outputs 12 actually being indicated (LEDs 40 GREEN) will move to the right or left along the row 38 indicating to the user at all times the relative position of the displayed operational control settings of outputs 12 in the complete set of outputs 12.

The setting of any dimmer 14 which is for the time being displayed by a channel controller 30 may be altered - by altering the operational control output 12 assigned with it - by the user simply moving the associated channel controller 30 in the desired sense.

Alternatively and/or additionally control of this function may be effected from keyboard 20 via buttons 42 and 44 by which the settings of the outputs 12 may be varied - in the example illustrated button 42 being used to increase the setting, and button 44 to decrease the setting, applied by output 12 to the channel in question.

If the user wishes to alter a setting of an output 12 not for the time being displayed by the bank 28 of channel controllers 30 he may move the "window" 36 covered by the bank until that setting is displayed and then simply move the appropriate controller 30 to effect the desired alteration in the setting.

Alternatively, a particular setting which is to be altered may be determined by the user using a numeric keypad 46 to enter the "number" of the output 12 prior to altering the setting making use of the buttons 42 and 44.

Again, the apparatus may provide that the settings of a number of different outputs 12 may be altered at one time by the user entering the "numbers" of those outputs prior to pressing button 42 or button 44.

The apparatus also provides that the setting of the output 12 for the time being displayed on bank 28 of controllers 30 directly above the buttons 42 and 44 may be altered by button 42 or button 44.

Operation of the system so far described is in accordance with a control strategy shown in the following flow charts in which:-

Ps is the number of outputs 12 displayed at any time on on bank 28 of controllers 30,

Pa(Ps) is an array of size Ps which contains the number of each output 12 controlled by the apparatus which is for the time being being displayed,

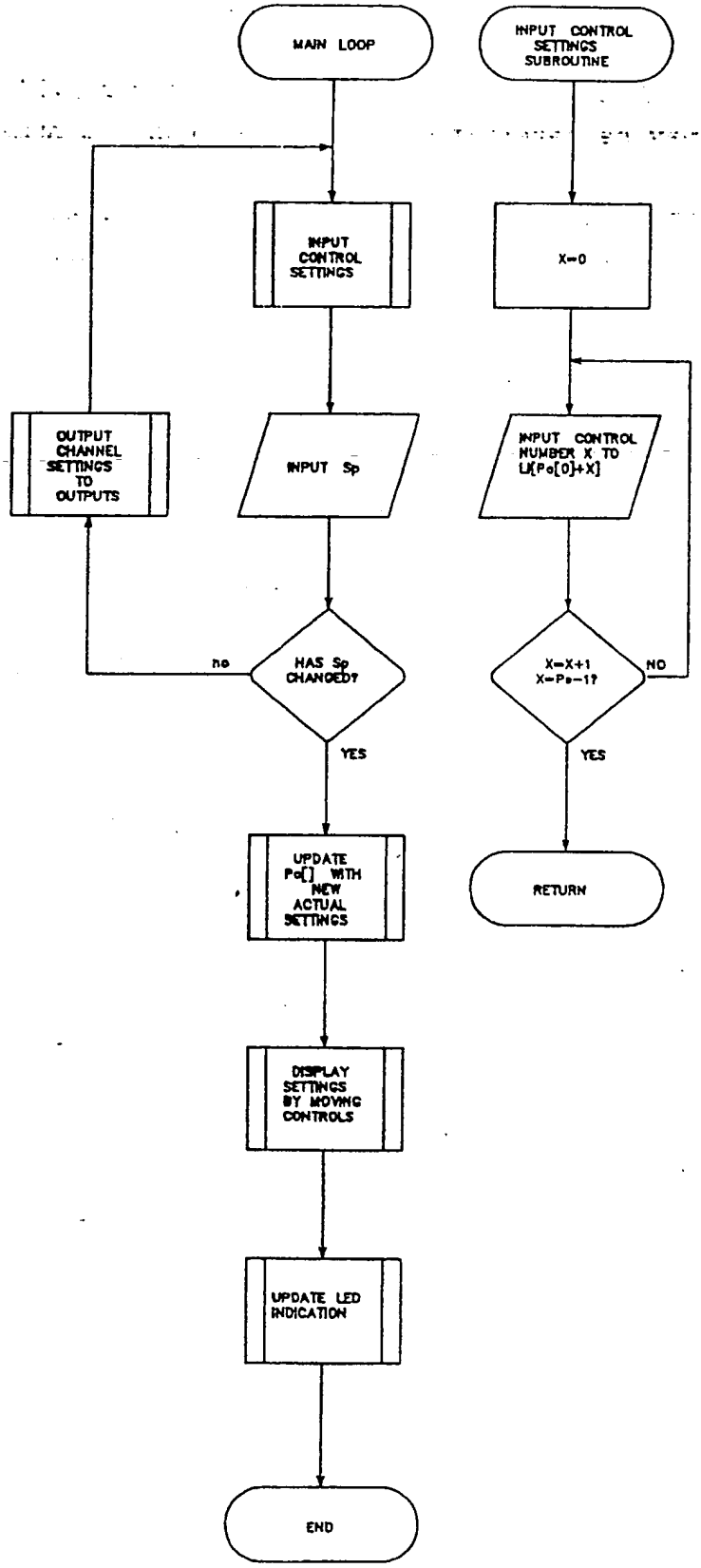
Ls is the total number of outputs 12 which are controlled by the apparatus,

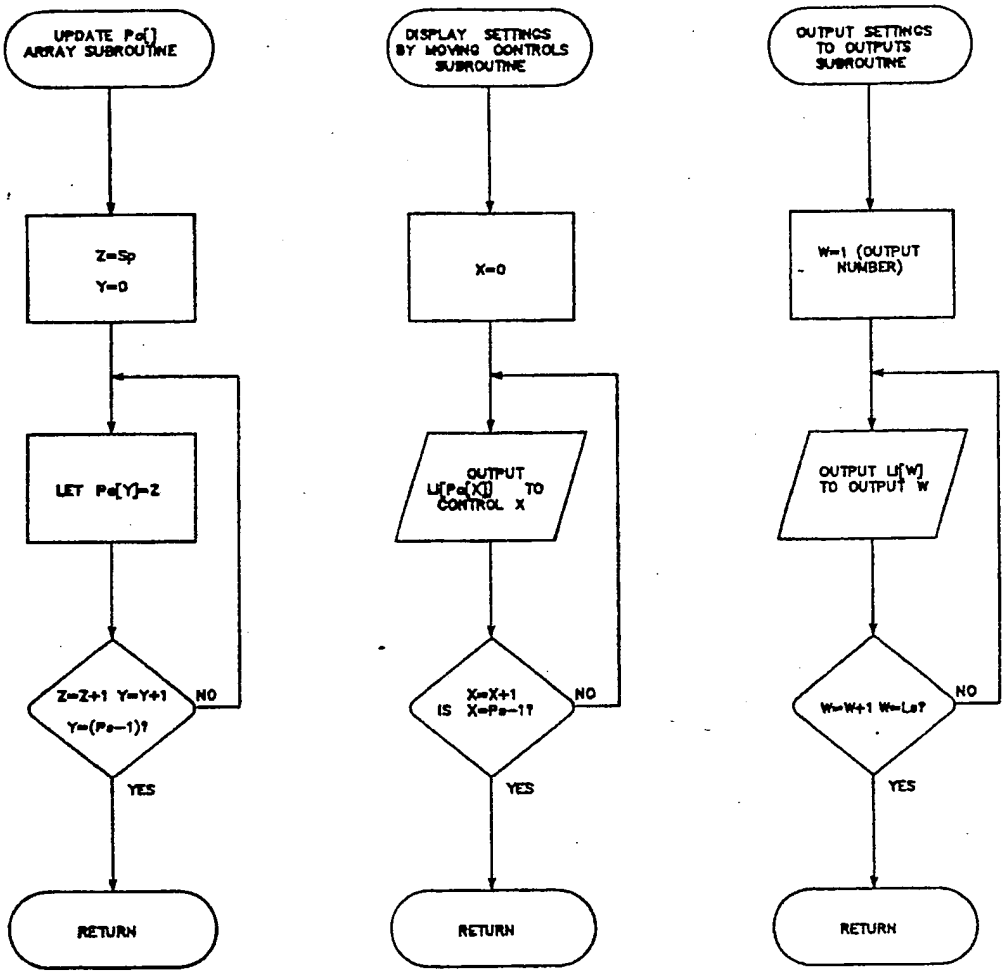
Li(Ls) is an array of size Ls containing the settings for all the outputs controlled by the apparatus,

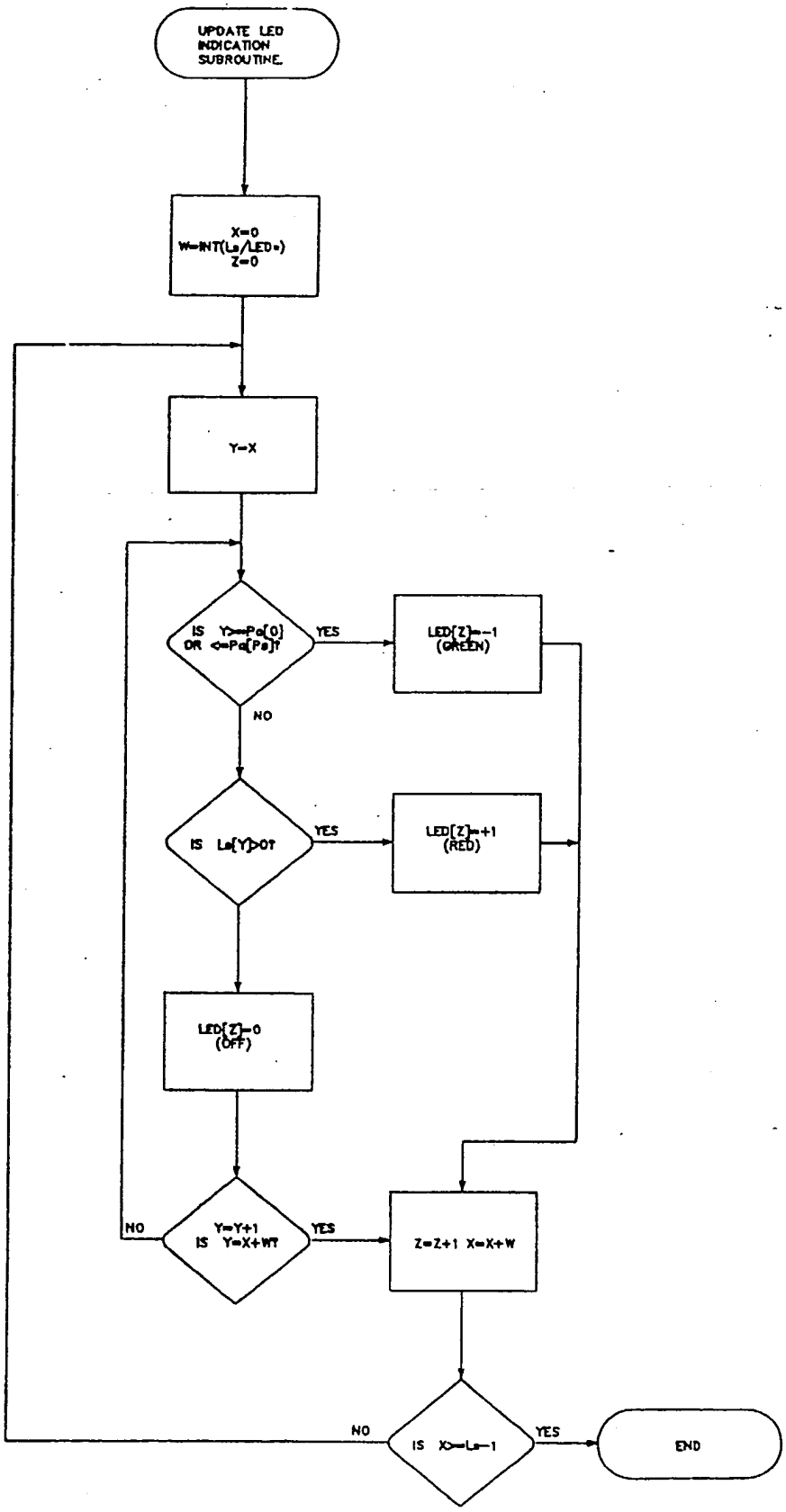
Sp is the current scroll position (the "number" of the output 12 for the time being in the first position in the "window" 36 of bank 28 of controllers 30),

Leds is the number of LEDs 40 in the row 38,

Led(Leds) is an array of size Leds containing the setting for each LED 40 of row 38 (0=OFF, 1=RED and -1=GREEN),


MAIN LOOP
INPUT CONTROL SETTINGS SUBROUTINE
INPUT CONTROL SETTINGS
X=0
OUTPUT CHANNEL SETTINGS TO OUTPUTS
INPUT Sp
INPUT CONTROL NUMBER X TO L[Pe[0]+X]
no
HAS Sp CHANGED?
X=X+1 X=Pe-1?
NO
YES
YES
UPDATE Pe[] WITH NEW ACTUAL SETTINGS
RETURN
DISPLAY SETTINGS BY MOVING CONTROLS
UPDATE LED INDICATION
END


UPDATE Pa[] ARRAY SUBROUTINE
Z=Sp
Y=0
LET Pa[Y]=Z
Z=Z+1 Y=Y+1
Y=(Pa-1)?
NO
YES
RETURN
DISPLAY SETTINGS BY MOVING CONTROLS SUBROUTINE
X=0
OUTPUT Li[Pa[X]] TO CONTROL X
X=X+1
IS X=Pa-1?
NO
YES
RETURN
OUTPUT SETTINGS TO OUTPUTS SUBROUTINE
W=1 (OUTPUT NUMBER)
OUTPUT Li[W] TO OUTPUT W
W=W+1 W=La?
NO
YES
RETURN


UPDATE LED INDICATION SUBROUTINE
X=0
W=INT(La/LED#)
Z=0
Y=X
IS Y>=Pa[0] OR <=Pa[Pa]?
YES
LED[Z]=-1 (GREEN)
NO
IS La[Y]>0?
YES
LED[Z]=+1 (RED)
LED[Z]=0 (OFF)
NO
Y=Y+1 IS Y=X+W?
YES
Z=Z+1 X=X+W
NO
IS X>=La-1
YES
END

In a preferred modification of the apparatus so far described the information displayed by channel controllers 30A to 30F may be altered to provide more readily to a user a display of the settings of the "active" outputs 12.

This display is shown in Figure 3B and provides that "active" outputs 12 are physically grouped together in bank 28 of controllers 30. It should be noted that this display - as illustrated - is such that the "window" 36 is located to show the lowest numbered outputs 12.

The illustrated display is of a situation where outputs "16", "45", "55" and "109" are "active" on a system capable of displaying say six outputs 12 and these four outputs are displayed by channel controllers 30B, 30C, 30D and 30E - that is to say centered in the bank 28 of controllers 30. The display given by channel controller 30A of the bank is of "inactive" output "1", and by channel controller 30F of "inactive" output "2".

As the "window" 36 is scrolled to display higher numbered outputs 12 (by pressing button 34) "inactive" outputs 12 will pass out of the "window" 36 to the left and into the "window" 36 from the right - however, the "active" outputs 12 "16", "45", "55" and "109" will continue to be displayed by channel controllers 30B, 30C, 30D and 30E of the bank 28.

If more controllers 30 are provided in bank 28 than shown the "active" outputs 12 displayed by the apparatus remain grouped and centered in the bank 28.

For example if the system had say thirty physical channel controllers 30 in the bank 28 the four outputs "16", "45", "55" and "109" would be displayed by the 14th, 15th, 16th and 17th controllers - again centered in the bank. The displays given by the the 1st to 13th controllers of the bank would be of "inactive" outputs "1" to "13", by the 18th and 19th controllers of the bank of "inactive" outputs "14" and "15", and by the 20th to 30th controllers of the bank of

"inactive" outputs "17" to "26".

Again, as the "window" 36 is scrolled to display higher "numbered" outputs 12 (by pressing button 34) "inactive" outputs 12 will pass out of the "window" 36 to the left and into the "window" 36 from the right - however, the "active" outputs 12 "16", "45", "55" and "109" will continue to be displayed by the 14th, 15th, 16th and 17th controllers.

If in this mode of operation the number of "active" outputs 12 is greater than the number of channel controllers 30 provided in the bank 28 then scrolling the "window" 36 will cause the "window" 36 to move over and sequentially display those "active" outputs 12.

The apparatus further provides in this mode of operation that during a scrolling operation "active" outputs 12 are held in the "window" 36 until the "window" 36 reaches the upper (or lower) of the range of outputs 12 being scanned.

For example, with a system having say 200 outputs 12 and a bank of 100 channel controllers 30 and assuming that there are 110 "active" outputs scrolling the "window" 36 to the right will move the displays of "active" outputs 12 in the "window" 36 until there are say 10 "inactive" outputs displayed in the first ten positions of the "window". Continued scrolling in the same sense will cause the "inactive" outputs 12 to scroll across these positions until "inactive" output number "1" is displayed in by the 1st controller 30 in the bank 28 - in the first position of the "window".

The apparatus may provide an "inactive" output 12 not currently included amongst those displayed by the controllers 30 has a setting applied to it - e.g. by using key pad 46 and the keys 42 or 44 - if will immediately be brought into (if space permits) the "window" 36 of displayed settings.

Alternatively the apparatus may be arranged to

provide that any output altered in this way is left out of the "window" 36 of displayed settings until such time as the user depresses button 32 or 34 to "scroll" the "window" - the altered output being brought into the correct display position in the "window" 36 when this "scrolling" is started.

A further alternative provides that any output altered in this way is left out of the "window" 36 of displayed settings until such time as the user - by depressing button 32 or 34 - scrolls "window" 36 across the altered output at which time the display of this output is brought into the correct display position in the "window" 36.

In place of buttons 34 and 32 (for causing movement of the "window") and the buttons 42 and 44 (for altering the settings of one or more outputs 12) elements similar to the channel controllers 30 may be used.

Generally, such devices provide for control of a function being controlled in response to the position of the control element.

In the present case it is envisaged that if such a "channel controller" is used to vary the "window" 36 shown by the bank 28 of controllers 30 the position of the control knob in the "channel controller" will be directly related to the particular outputs 12 for the time being assigned to the bank of channel controllers 30 - the more to the right (or left) the knob is placed the higher (or lower) the "numbered" outputs 12 will be displayed by the bank 28 of channel controllers 30.

It is possible for the other channel controllers to be of the same form, however, the embodiment of the invention invention now described provides that the other channel controllers in the apparatus are of a modified form providing for linear control of a function being controlled in response to the degree of movement of the control element.

That is to say in the example above the rate at which the controlled output is varied by movement of a knob of a channel controller may be dependent upon the extent to which the control knob of the slider is moved from a median or neutral position.

Again, this embodiment of the invention provides not only this form of linear control but also a tactile indication to the user of the rate at which the controlled function is being altered.

This is provided in the apparatus by modifying the arrangement shown in Figure 1 to include a motorised slider show at 50 in Figure 4. Motorised slider 50 includes a position sensor 52 connected to processor 10 via an analogue to digital convertor 54 as shown. In response to the output of convertor 54 the processor provides an output schematically indicated at 56 controlling alteration of the desired function at a rate dependent upon the output of convertor 54 - that is to say the extent to which motorised slider has been moved from the median. To this extent the arrangement is of known form.

The arrangement shown in Figure 4 further provides that processor 10 generates an output on line 58 which is fed to a digital-to-analogue convertor 60 feeding an analogue control signal via a servo unit 62 back to the motorised slider 50. The position sensor output is also fed to the servo unit 62 as shown.

The normal state for the motorised slider 50 is with it's control knob in a median, central position. On movement of the knob away from this position the processor alters (increases or decreases) the level of the function being controlled. The further from this position the greater the rate of alteration provided by the processor of the function being controlled. If the knob is released it will automatically return to it's median position.

Assuming the motorised slider 50 is 8 bit encoded as +/- 127 to either side of it's median position and the

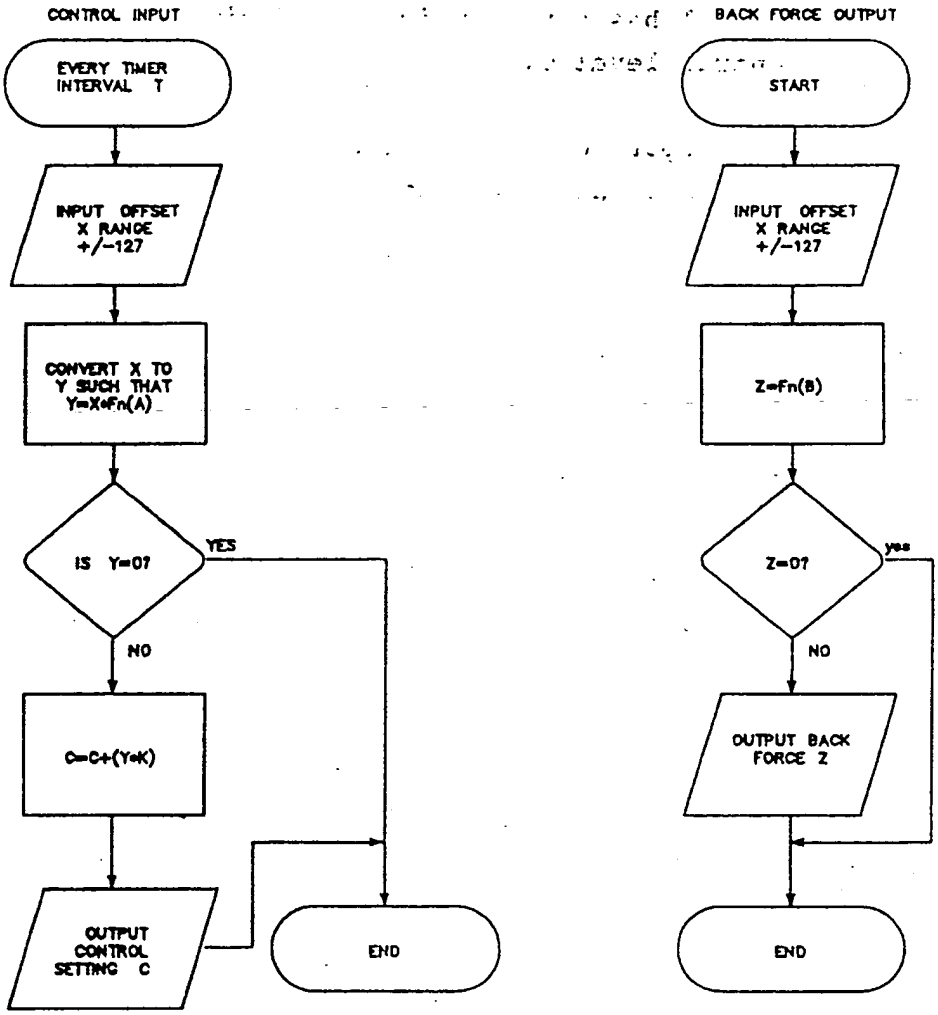
unit under control has a resolution of 16 bits and is at an operational control level C.

At intervals T (e.g. of one millisecond) processor 10 scans the output of convertor 54 and determines the movement X of the knob from the median position. The value X is converted by processor 10 (using a "look-up" table) into a value Y and the output 56 derived from the expression A=A+(Y x K) where K is a system constant.

The destination output Z of the motorised slider 50 (the signal on line 58) is normally set to the median position so that when the it is released the knob will return to it's median position. However, in the apparatus of the present invention now described the destination output is altered and given a value from the expression Z=X x FN(B), where FN(B) sets the amount of back force for a given displacement of the knob. Thus the motorised slider 50 provides a force resisting movement of the knob which is greater the farther the knob is from it's median position.

When the knob is released it will start to return to it's median position and as it does so the value of Z will alter until, as it nears the neutral position, Z again equals the neutral position setting.

Operation of this element of the system is in accordance with a control strategy shown in the following flow charts.



The control function controlled in this way may be that applied to any output 12 of the system.

It will be appreciated that the microprocessor 10 above described may be any suitable processing unit capable of controlling the desired number of outputs 12 and that the microprocessor may be hardwired to provide the described control functions or be operating under under appropriate soft- or firm-ware control.

It will be appreciated that many modifications may be made to the disclosed arrangements without departing from the scope of the invention.

For example, the number of LEDs provided may be less than the total number of channels controllable by the apparatus - providing always that to achieve the advantage of this LED display the number of LEDs provided corresponds to a set of the channels greater in number than the number of channel controllers 30 used to provide the display window 36.

In such an arrangement it is possible for each LED to indicate the settings applied to a number (say two or three) channels providing an "active" indication if one of more of those channels are "active". Alternatively, each LED may be individually assigned to one of the controllable channels and provide a wider "window" than is provided by controllers 30 - the "window" provided by the LEDs being centered on that provided by the controllers 30 and the outermost LEDs of the indication 38 perhaps being arranged to flash if controllable channels exist to either side of the indication "window".

Although implemented making use of physical controllers 30 it will be appreciated that the method and apparatus of the invention are not limited to their use and that other devices may be used to used to enable the variation of the settings applied to the channels and to display those settings - for example, the display window 36 may be provided as a video image of controllers as may be the indication herein described as being provided by the LEDs. In such an arrangement variation of the settings applied to the controllable channels may be effected in any suitable way - such as the use of rotary or linear switches or even a touch or light sensitive video display screen.

It will be appreciated that the arrangements described may be further modified from that described without departing from the scope of the present invention; and further that other common variants in this type of control arrangement which will readily be seen by those skilled in the art have not been explicitly now described.

CLAIMS

1. A method enabling control of operation of a plurality of controllable channels, the method including the steps of enabling operational settings to be applied to some or all of the channels, of enabling those settings to be selectively varied, of displaying the settings applied to a group of said channels within the plurality of channels, and of enabling the displayed group of channel settings to be varied so as to display the settings applied to others of the channels within said plurality of channels.

2. A method as claimed in Claim 1, including the step of indicating the settings applied to a set of controllable channels greater in number than said group of channels.

3. A method as claimed in Claim 1 or Claim 2, including the steps of allowing the displayed group of controllable channel settings to be variable by enabling the settings of channels of the plurality of channels to be sequentially brought into and removed from the group of displayed channel settings in response to inputs by a user.

4. A method as claimed in any one of Claims 1 to 3, which provides said display of the settings of the group of controllable channels by driving drivable channel controllers for the time being associated with the channels to positions representative of the settings applied to those channels.

5. A method as claimed in any one of Claims 1 to 4, which provides adjacent visual displays of the settings applied to active non-sequentially adjacent controllable channels of said plurality of channels.

6. A method as claimed in any one of Claims 1 to 5, which provides that the settings applied to more than one controllable channel are variable in response to a single input by a user.

7. A method as claimed in any one of Claims 1 to 6, which provides for the use of a microprocessor to enable the

selective variation of the setting of each controllable channel and to control said channel settings display.

8. Apparatus enabling control of operation of a plurality of controllable channels which comprises, means enabling operational control settings to be applied to each of the channels and for enabling those settings to be be selectively varied, means for displaying the settings applied to a group of said channels within the said plurality of channels, and means enabling the displayed settings to be varied to show the settings applied to others of the channels within said plurality of channels.

9. Apparatus as claimed in Claim 8, wherein the means for displaying the settings applied to the group of controllable channels comprises a group of elements each of which is operable to display the setting applied to an assigned one of the said group of channels and the means enabling variation of the of the settings displayed comprises means for altering the channels assigned to ones of said elements.

10. Apparatus as claimed in Claim 9, including means enabling the control settings of controllable channels of the plurality of channels to be sequentially brought into and removed from the group of displayed channel settings in response to inputs by a user.

11. Apparatus as claimed in Claim 9 or Claim 10, wherein said elements comprise channel controllers each of which is drivable to a position representative of the setting applied to a controllable channel for the time being assigned thereto.

12. Apparatus as claimed in any one of claims 8 to 11, further including means enabling the settings applied to a set of controllable channels greater in number than said group of channels to be indicated.

13. Apparatus as claimed in claim 12, wherein said indicating means enables the settings of all the controllable channels to be indicated.

14. Apparatus as claimed in Claim 12 or Claim 13, wherein the means indicating the settings applied to said set of controllable channels are LEDs.

15. Apparatus as claimed in any one of claims 8 to 14, and which is operable to provide adjacent displays of the control settings applied to active non-sequentially adjacent ones of said plurality of controllable channels.

16. Apparatus as claimed in any one of claims 8 to 15, further including means enabling the alteration of the rate at which the control settings of the group of channels displayed is varied to be responsive to said input by a user.

17. Apparatus as claimed in any one of claims 8 to 16, further including means enabling alteration to the rate at which the operational settings applied to each of the controllable channels to be selectively varied in response to an input by a user.

18. Apparatus as claimed in any one of claims 8 to 17, further including means enabling the operational settings applied to more than one controllable channel to be variable in response to a single input by a user.

19. Apparatus as claimed in any one of claims 8 to 18, including a microprocessor operable in response to an input from a user to enable selective variation of the setting of each controllable channel and to control said channel settings display.

20. A device for use in the apparatus of any one of claims 8 to 19, having a part which is manually movable to control the value of a setting applied to a controllable channel and the position of the manually movable part is proportional to the rate of change applied to the said value, wherein the device includes means for sensing the rate of change applied to said value and applying to the manually movable part a force resisting movement thereof by an amount proportional to the to the rate of change applied to the said value so as to provide to a user a tactile indication of the rate of

change applied to the said value.

21. A device as claimed in claim 20, including a motorised part which is manually movable and sensing means operable to sense the position of the manually movable motorised part and to control the rate of alteration of the said value and which further comprises means for generating and feeding to the manually movable motorised part a signal which is a function of the position of the control knob of the manually movable motorised part from a median position and which tends to exert a force thereon resisting movement of the manually movable motorised part from said median position.

22. A method as claimed in Claim 1 and substantially as herein described.

23. Apparatus as claimed in Claim 8 and substantially as herein described with reference to Figures 1, 2 and 3 of the accompanying drawings.

24. Apparatus as claimed in Claim 23 further including a device as claimed in Claim 20 and substantially as herein described with reference to Figure 4 of the accompanying drawings.

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